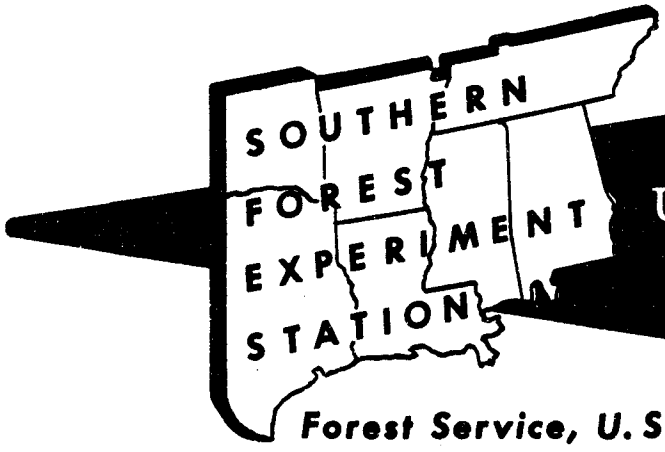

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RESEARCH NOTE

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GROWTH AND BRANCHING OF YOUNG COTTONWOODS AFTER PRUNING

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SOUTHERN FOREST EXPERIMENT STATION

Although spring and summer pruning to various heights reduced diameter growth for the treatment year, diameter increment of most pruned trees did not differ significantly from that of controls 2 years after treatment. Total diameter growth during the test period was significantly less for pruned trees than for controls. Epicormic branching increased with spring treatments and with greater pruning heights. Pruning is apparently necessary to obtain high-quality stems. Summer prunings are preferable to spring ones, and no more than one-third of the total height measured during the dormant season should be pruned.

Additional keywords: *Populus deltoides*, wood quality, epicormic branching, sawtimber, veneer.

Stumpage value of cottonwood (*Populus deltoides* Bartr.) saw logs and veneer logs may be 16 times greater than that of pulpwood on a cubic-foot basis. Trees to be used as sawtimber or veneer should therefore be managed for wood quality as well as growth. The most desirable trees have large diameters, a minimum of corewood, and no stem defects. Wide planting spacings result in rapid diameter growth, and pruning both reduces defect and minimizes core size. However, pruning at an early age may reduce diameter growth and stimulate epicormic branching. This study compared growth and branching of pruned and unpruned cottonwood trees planted on two sites.

METHODS

The two plantations are at Catfish Towhead, which is about 20 miles northwest of Greenville, Mississippi, and Georgetown Towhead, located in Arkansas about 12 miles southwest of Catfish. Soils are chiefly Commerce. The sites were cleared before planting in 1968; initial spacings were 9 by 9 feet at Catfish and 10 by 10 feet at Georgetown.

During the second growing season (May and June 1969), residual trees were pruned to about 5 feet in height. The plantations were then selectively thinned to an 18- by 18-foot spacing at Catfish and a 20- by 20-foot spacing at Georgetown.

During the third year, three replications of four pruning treatments were installed in a randomized complete block design. There were

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24 trees per plot. Treatments consisted of no pruning (control) and pruning to 9-, 13-, or 17-foot heights in either March-April (spring pruning) or in June-July (summer pruning). The 17-foot pruning at Catfish was delayed until the fourth year to allow the trees to grow tall enough to treat. At that time, the 9-foot pruning on both sites was increased by 8 feet (to 17 feet).

Heights and diameters of all trees were measured after the second and third years. Diameters were remeasured after the next two seasons, although final measurements on the Georgetown plots were delayed for several months because of high water.

The number of pruned trees with epicormic branches was recorded for all pruned plots after the third growing season and in the fifth growing season on Catfish plots pruned the fourth year. Branches were tallied by length as 3 feet or less or as greater than 3 feet.

Differences in diameter and height growth between pruning treatments were evaluated by analysis of variance at the 0.05 level.

RESULTS AND DISCUSSION

After 2 years, mean height for Catfish plots was 20 feet and mean diameter was 3.0 inches; at Georgetown, mean height was 27 feet and mean diameter, 4.2 inches. Third-year pruning to 9 and 13 feet removed 45 and 65 percent of the mean second-year height at Catfish. The 9-, 13-, and 17-foot prunings at Georgetown removed 33, 48, and 63 percent of the average second-year height.

During the third growing season, control trees grew significantly taller than some of the pruned trees, although the differences were of no practical importance. Average tree heights at the end of the season were 31 feet for Catfish and 39 feet for Georgetown.

Although pruning reduced diameter growth during the year of treatment, diameter increment of pruned trees was about the same as that of controls in the fifth growing season (table 1). Total diameter increment during the 3-year test period was significantly greater for controls than for pruned trees; however, the effects

Table 1.—*Diameter growth of pruned trees on two sites for the third, fourth, and fifth growing seasons*

Site, season, and pruning height	Growing season			Total
	Third	Fourth	Fifth	
	Inches			
Catfish[1]				
Control	2.46 a[2]	1.55 a	1.27 a	5.28 a
Spring				
9 feet	2.13 b	1.10 c	1.28 a	4.51 bc
13 feet	1.97 bc	1.48 a	1.30 a	4.75 b
17 feet	2.44 a	0.99 c	1.22 ab	4.65 b
Summer				
9 feet	1.99 bc	1.11 c	1.04 b	4.14 c
13 feet	1.91 c	1.35 b	1.20 ab	4.47 bc
17 feet	2.34 a	1.24 b	1.20 ab	4.78 b
Georgetown[3]				
Control	2.37 a	1.60 a	1.62 abc	5.59 a
Spring				
9 feet	2.19 b	1.31 d	1.63 abc	5.12 bc
13 feet	1.97 d	1.54 ab	1.66 ab	5.17 bc
17 feet	1.56 f	1.45 bc	1.64 abc	4.65 d
Summer				
9 feet	2.25 b	1.46 bc	1.55 bc	5.26 b
13 feet	2.09 c	1.51 ab	1.54 c	5.14 bc
17 feet	1.82 e	1.39 cd	1.71 a	4.92 c

[1] Catfish trees pruned to 9 and 13 feet in third year, 17 feet in fourth year, and 9 feet increased to 17 feet in fourth year.

[2] Means followed by same letter not significantly different at 0.05 level.

[3] Georgetown trees pruned to 9, 13, and 17 feet in third year, and 9 feet increased to 17 feet in fourth year.

of pruning on diameter increment would probably be negligible after 15 or 20 years.

By the end of the third year, the percentage of trees with epicormic branching increased with pruning height and with spring pruning (table 2). Minimum branching occurred with pruning to 9 feet in summer; 79 percent of the trees receiving this treatment had no epicormic branching at Catfish and 99 percent at Georgetown. At the Catfish site, the level of branch-free stems decreased to 35 percent when pruning height was increased from 9 to 17 feet in the fourth year.

Spring prunings produced longer epicormic branches than summer treatment, probably because of differences in the length of the growing season. For trees with one or more epicormic branches, 86 percent of the trees pruned in spring had at least one branch longer than 3 feet compared to 16 percent for trees pruned in summer.

Control trees showed no tendency toward natural pruning; therefore, pruning is apparently necessary to obtain high-quality stems at the spacings used, despite some losses in diameter growth. To obtain minimum epicormic branching, summer pruning is advantageous as is pruning no more than one-third of the total height measured during the dormant season.

Table 2.—*Percentage of trees producing a given number of epicormic branches during third year after spring and summer pruning to indicated heights*

Site, season, and pruning height	Number of branches		
	None	One, two, or three	Four or more
	— — — *Percent* — — —		
Catfish			
Spring			
9 feet	29	52	19
13 feet	20	41	39
Summer			
9 feet	79	14	7
13 feet	39	45	16
Georgetown			
Spring			
9 feet	45	43	12
13 feet	31	42	27
17 feet	4	19	77
Summer			
9 feet	99	1	...
13 feet	59	36	5
17 feet	24	54	22